WHAT'S SOLAR WORTH?

Bringing Minnesota's value(s) to solar

John Farrell, Director of Democratic Energy

Presentation to Minnesota Value of Solar Stakeholder Workshop - Oct. 1, 2013

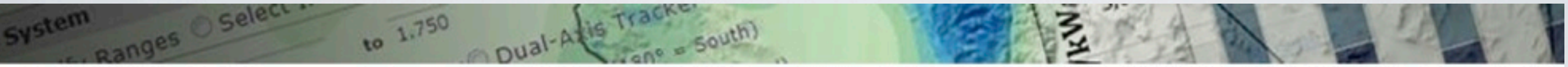
ILSR
INSTITUTE FOR
Local Self-Reliance

BACKGROUND

- 2007 Next Generation Energy Act: goal of **reducing greenhouse gas emissions by 80% by 2050** and that state should pursue "the development and use of renewable energy resources wherever possible."

- 2013 Energy Omnibus law includes "a Minnesota energy future study on how Minnesota can achieve a sustainable energy system that **does not rely on the burning of fossil fuels**."

ENERGY

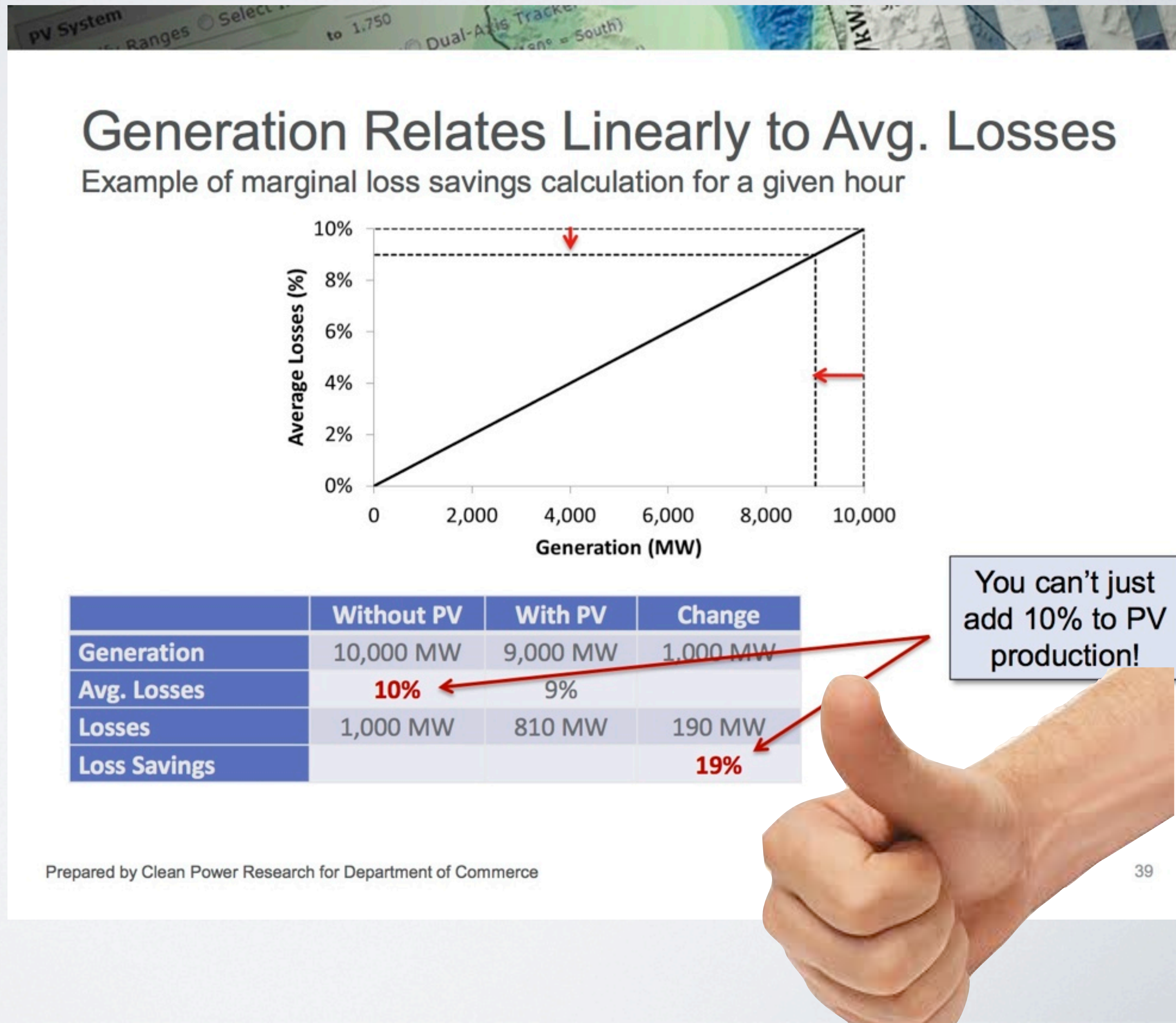


Other Possible Components May Include

Value Component	Basis	Legislative Guidance
Voltage Control	Cost to regulate distribution (future inverter designs)	
Market Price Reduction	Cost of wholesale power reduced according to reduction in demand.	
Disaster recovery	Cost to restore local economy (requires energy storage and islanding inverters)	

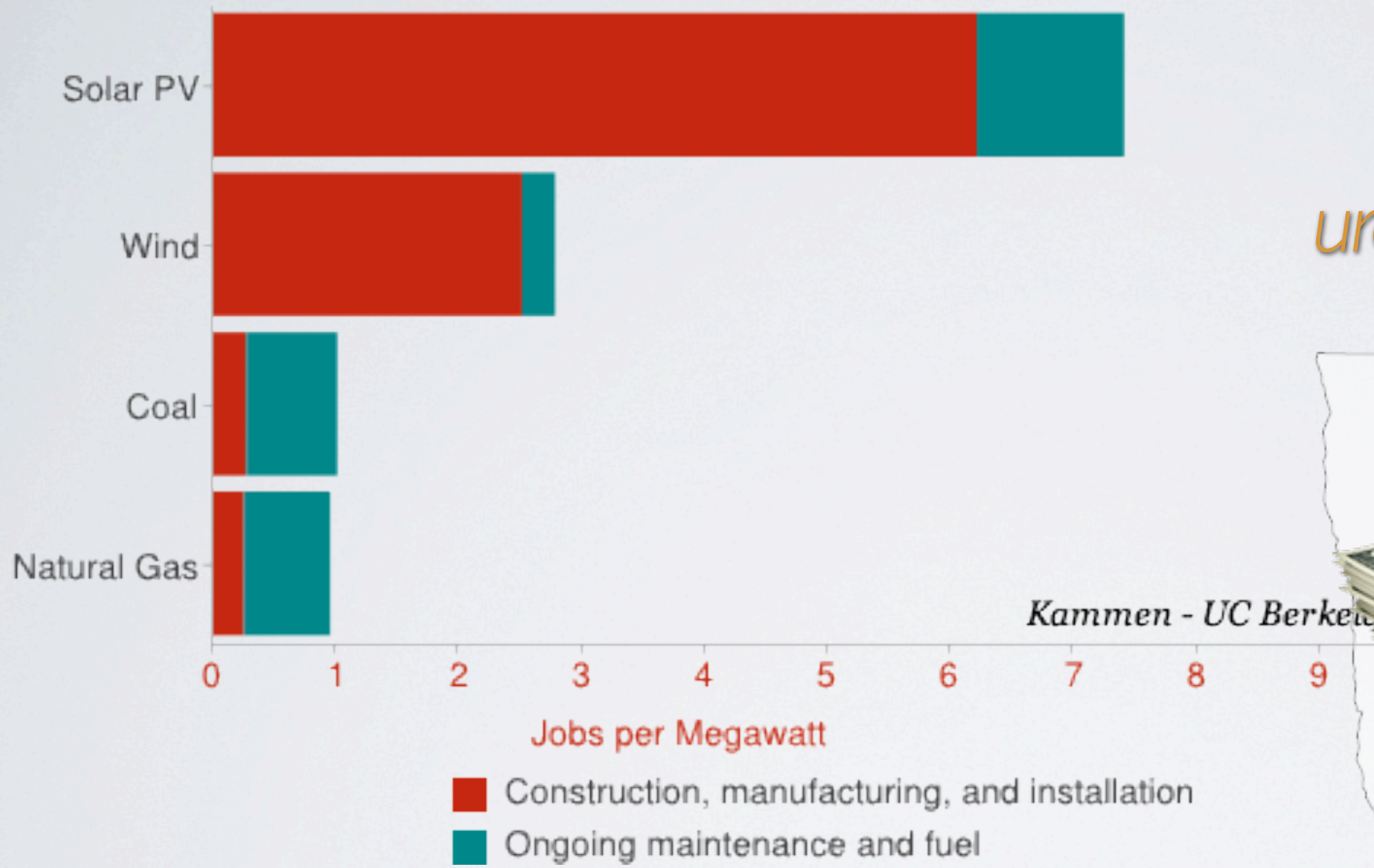
LOSSES

- But, high load means higher losses



	Without PV	With PV	Change
Generation	10,000 MW	9,000 MW	1,000 MW
Avg. Losses	10%	9%	
Losses	1,000 MW	810 MW	190 MW
Loss Savings			19%

ECONOMIC DEVELOPMENT



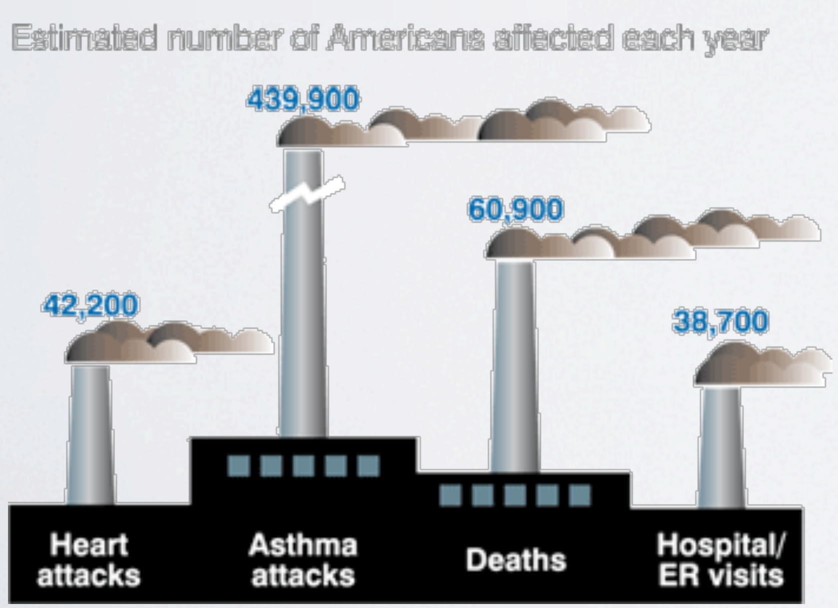
MN has no coal, uranium, or natural gas

ENVIRONMENTAL

New Regs.

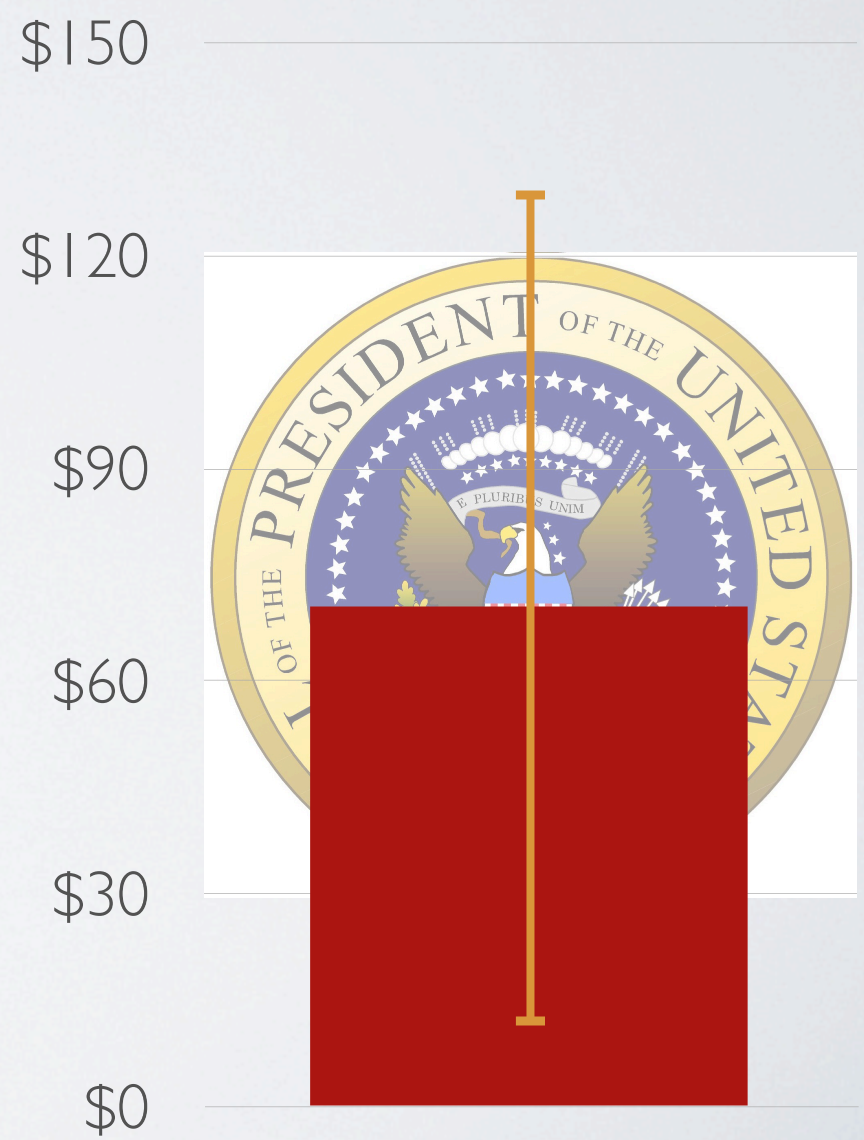
- Cross-State Air Pollution Rule (CSAPR)
- Carbon Pollution Standards for the Power Sector

The Price of Coal



Source: EDF

Social Cost of Carbon



RELIABILITY / RESILIENCE

SECURITY

ITY: RELIABILITY AND RESILIENCY

solar grid efficiency VIDEO RESOURCE CENTER GT

ALL GRID | Network Infrastructure | Grid Optimization | HAN/BAN | Demand Response | PV, EV, & Sto

Smart Grid Saves EPB Chattanooga $1.4M in One Storm

A smart grid and switches keep the lights on in Tennessee.

Katherine Tweed: October 17, 2012

In July, we reported on the first real test of EPB Chattanooga's smart grid investment that occurred when a powerful windstorm roared through the city in Tennessee.

The utility, which serves 170,000 customers, found that it cut its power outages by at least half, according to Jim Glass, manager of smart grid development at EPB Chattanooga.

At the time, Glass said it was difficult to put a monetary figure on the savings. But new data has done just that. The utility has been installing 1,200 S&C IntelliRupter automated switches on the distribution grid since early 2011. The utility also boasts one of the fastest internet pipelines in the world and a full of smart meters

APPROACH & KEY CHOICES

What is the value of increased reliability and resilience?

- Economic value of reduced blackouts

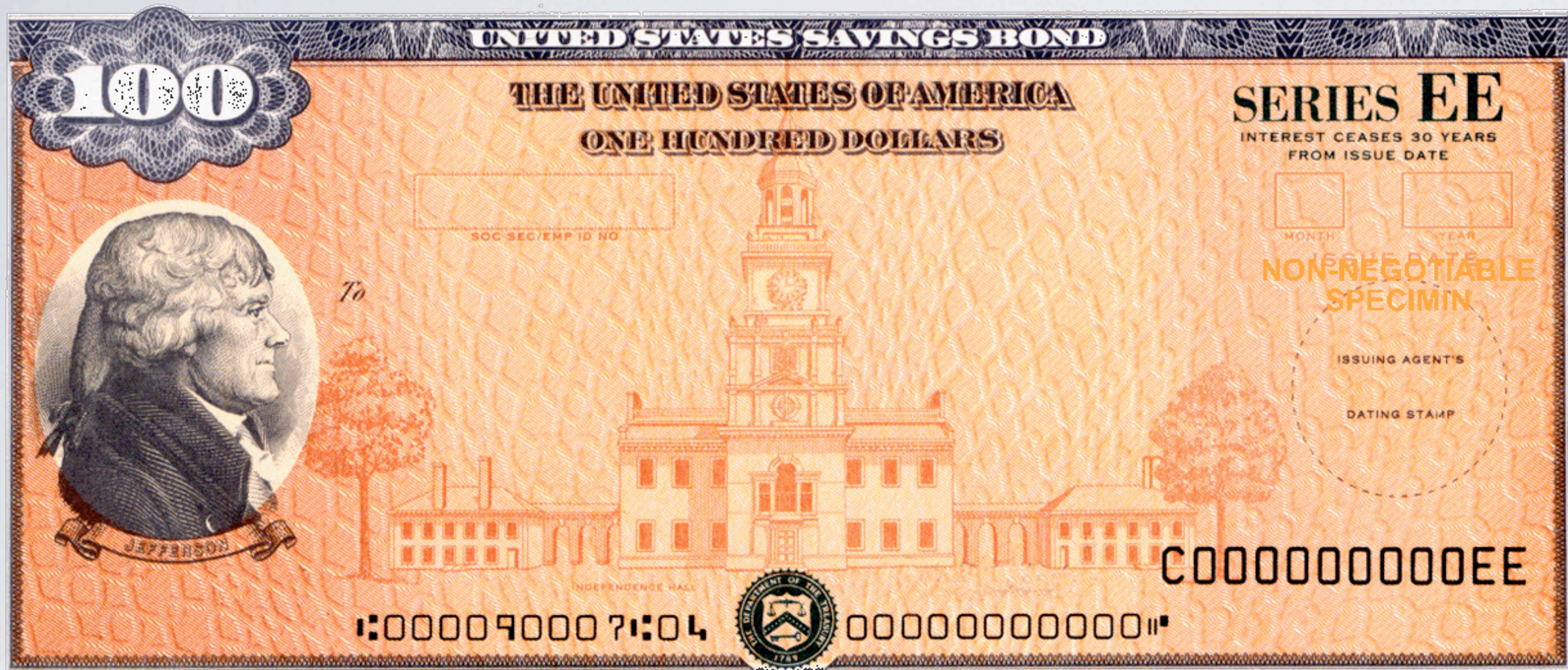
Disruption Value Range by Sector
(cents/kWh $2012)

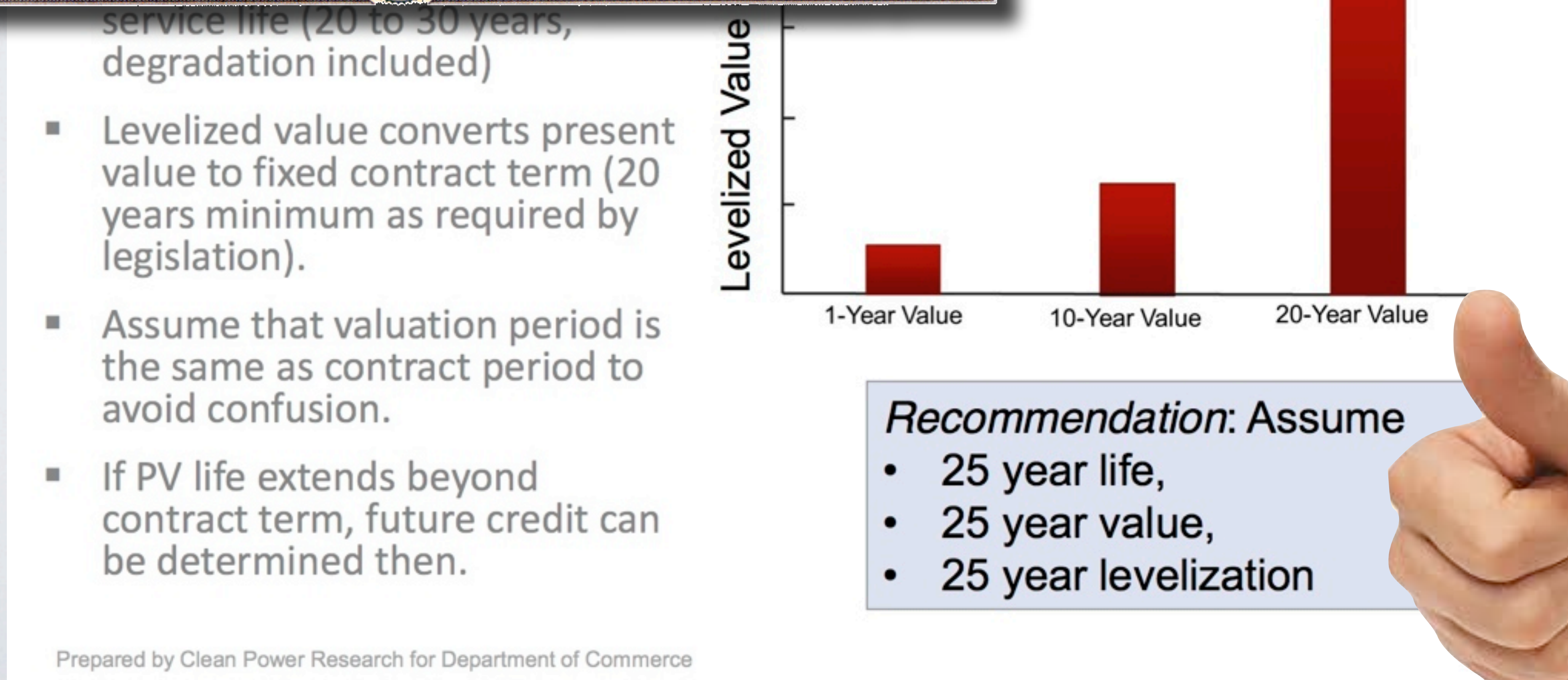
Sector	Min	Max
Residential	0.028	0.41
Commercial	11.77	14.40
Industrial	0.4	1.99

Source: The National Research Council, 2010

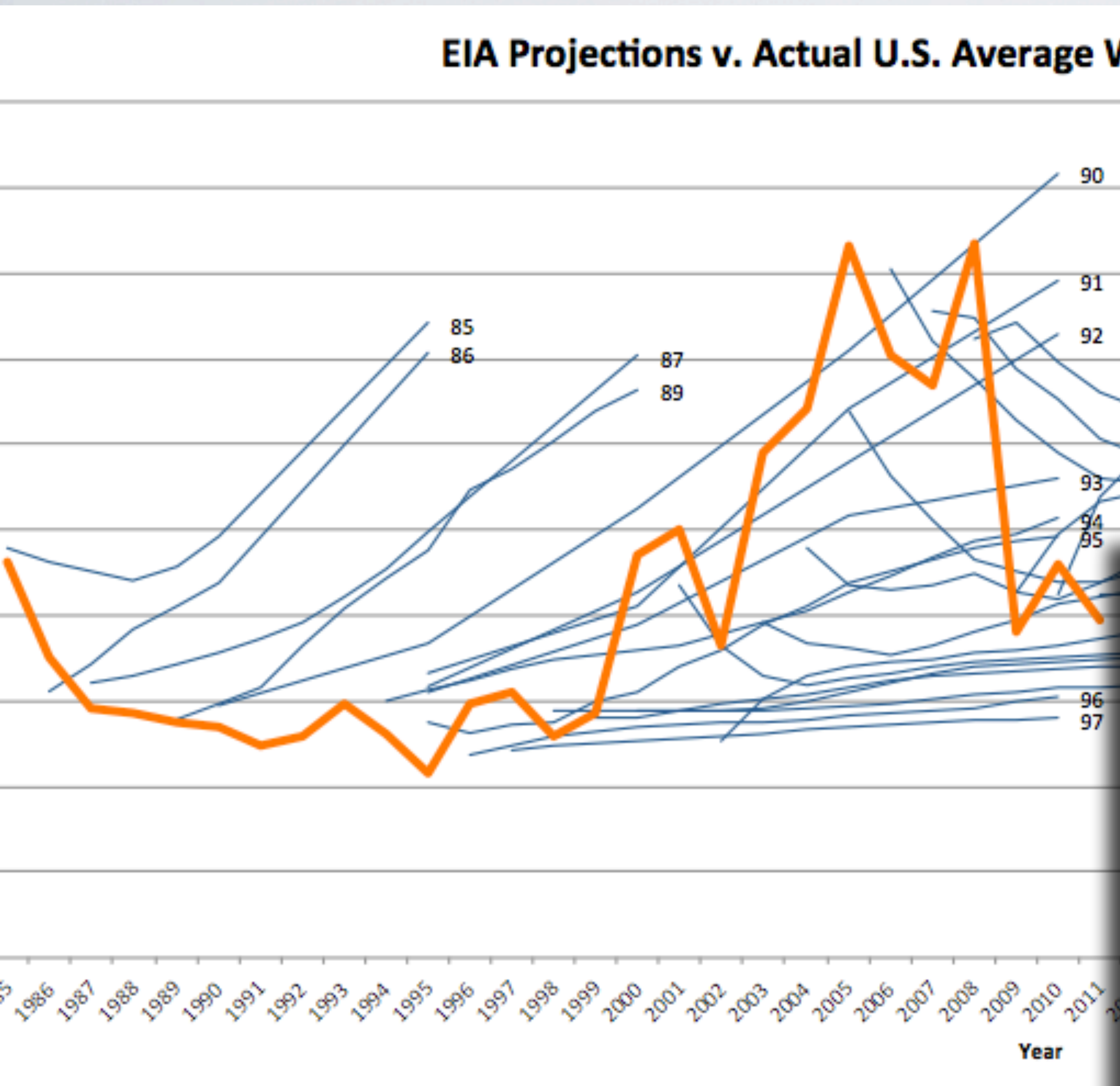
How much can DPV increase reliability

RATE / TIMEFRAME





HEDGING



EIA Projections v. Actual U.S. Average Wellhead Natural Gas Prices
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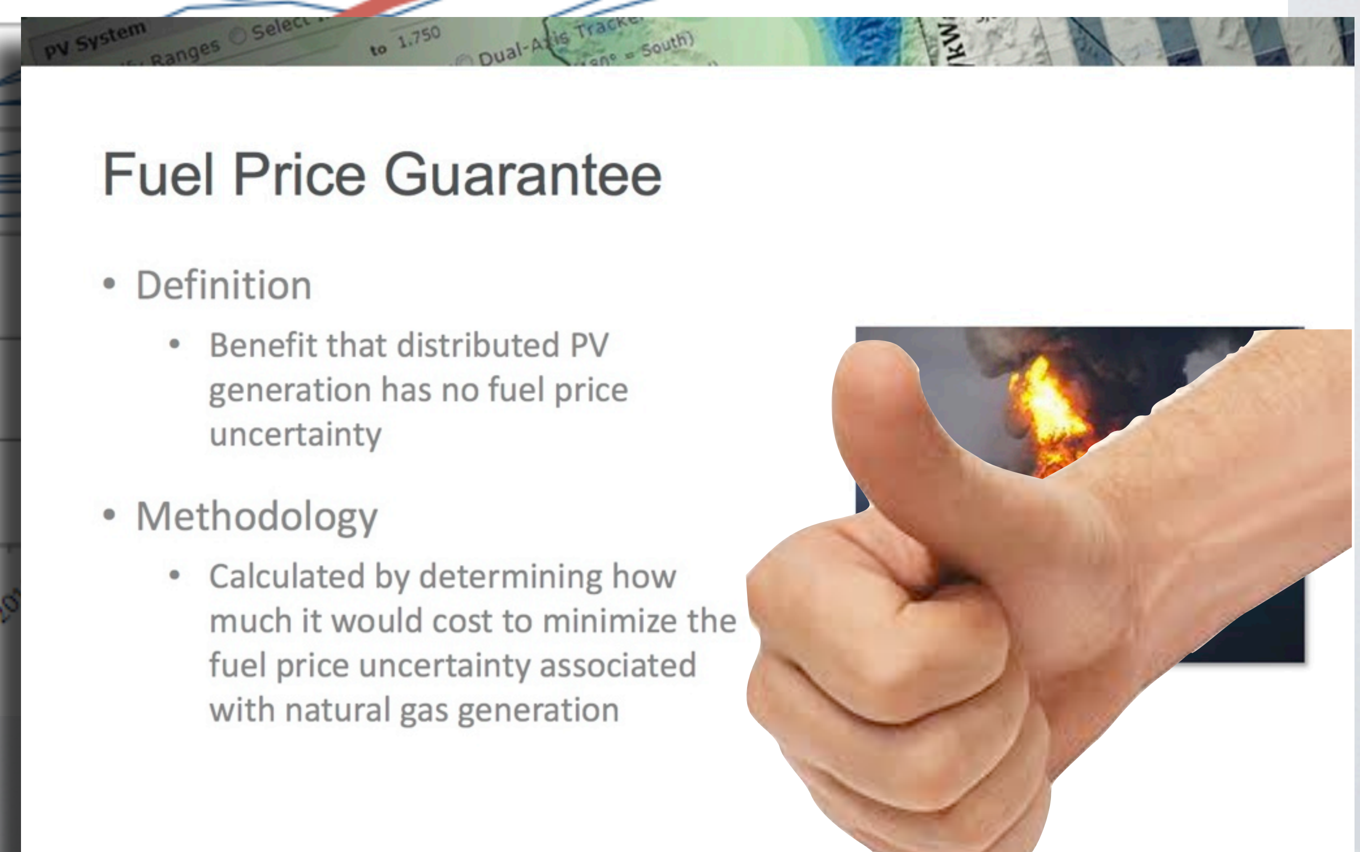

Fuel Price Guarantee
• Definition
• Benefit that distributed PV generation has no fuel price uncertainty
• Methodology
• Calculated by determining how much it would cost to minimize the fuel price uncertainty associated with natural gas generation

TRANSPARENCY

• Utility inputs, too!